

# Building a Knowledge Repository: Linking Jordanian Universities E-library in an Integrated Database System

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## Abstract

University library always seen as the mother source of knowledge, it contains all types of knowledge (Books, Projects, Papers, Dissertations, Thesis... etc). Many universities are transforming their libraries to e-library or digital library. Jordanian universities began automating their libraries in the early 1980s, and today they are switching to e-library.

But despite the rise of e-library still researchers and students find a hard time in searching for certain data or information because it is scattered here and there in different university libraries (traditional or e-libraries) or may be some times not stored in proper manner, neither accessible to other researchers, Jordanian universities are floating of knowledge but are not smartly utilized due to the lack of connection between university e-libraries.

The study believe that library can still have the opportunity to switch back the attention and interests of people and academicians and other researchers through the new attractiveness look, therefore, the main objective of this paper is built on the belief that building a knowledge repository can be through linking Jordanian universities e-libraries in an integrated database System that can allow and encourages the academicians, administrators, lecturers, researchers, information workers, and librarians to quick and easily access all Jordanian university e-libraries through one database system, such integration can efficiently preserve and provide knowledge, beside the supporting, uploading and the downloading of knowledge assets. The study concluded that Jordanian universities have all the possibilities to successfully establish such project, but at the same time there are some serious challenges need to be taken in consideration. They include collection building, infrastructure, acceptability, access restrictions, readability, standardization, authentication, preservation, copyright, policy and strategic issues, user interface, funding etc. Yet the advantages outweigh most of the bottlenecks and hardships and therefore the importance of integrating e-libraries in one database have been recognized by many nations of the world.

**Keywords:** Knowledge repository, E-library database, University

## 1. Introduction

They call our age as "Information Age" or "Knowledge Age", and as we live in the beginning or may be in the mid wave of "digital World", the world moves towards 'knowledge-based economy', knowledge is being considered as the main driver of this new economy, It became the most important asset of modern organizations as most scholars and specialists proclaim, so the success of economies in the future is going to be based on how companies or organizations acquire, use and leverage knowledge effectively (Bircham-Connolly etl, 2005).

Organizations are pushed toward investing on knowledge by all means and rely not only on one source, but several different sources to create and apply knowledge. One of the most important sources is the university, it's always been looked at University as the prime source and producer of knowledge of different types, because human knowledge exists in different forms: tacit and explicit, tacit knowledge is that which is experiential, intuitive, insights and hunches; It is the subjective and experience-based knowledge that cannot be expressed in words, sentences, and formalized or articulated, and therefore difficult to share; Explicit knowledge on the other hand refers to knowledge that has been expressed into words and numbers, such knowledge can be shared formally and systematically in the form of data, specifications, manuals, drawings, audio and video tapes, computer programs, patents, and the like (Alhawary and Alnajjar, 2008).

Knowledge in universities can take different forms such as Books, Projects, Papers, Dissertations, Thesis... etc, A growing number of universities are implementing knowledge repositories to preserve and to provide electronic access to the research output of their faculty, as well as repository systems providing access to locally digitized or digitally acquired library resources, including electronic books, manuscripts, and other media.

The purpose of this study is to explore the possibilities and factors that stand behind the idea of building a knowledge repository by linking Jordanian universities e-library in an Integrated database System, to achieve the main objective of the study, the paper is organized through the following sections: The first part will focus on the concept of e-library, Knowledge Repository concept and implications, The second part discusses the related literature review. The third part will explore the possibility and factors that enable the building of knowledge repository through linking Jordanian universities e-library in an Integrated database System, The fourth part highlights the benefits of applying such proposal, and in the final part covers the conclusion and recommendation.

## 2. Theoretical Background

### 2.1 What is an e-library?

An electronic library (e-library) is an electronic collection or knowledge portal containing multiple publications, documents and papers in various formats. Accessible through a single interface, this collection of electronic content is organized in such a way that it allows users to search and browse information relevant to them, thus speeding up resource discovery and directing the user to pertinent content. By including subscription and user authentication features within the e-library, individuals may locate content that has been purchased by their institution, and therefore access individual articles. This automated subscription access process replaces what would have been a number of heavy administration routes to retrieving data.

E-library contains many materials, tools and services that include: Online Published Material (e-books, e-journals) Online Reference Tools (Catalogs, indexes dictionaries, encyclopedias, directories) Online Information Services ( chat references, technology help, online tutorials) Electronic Records management, Administrative Data Warehouse, Digital Publishing Assistance (pre-print services, Web site development and maintenance, E-books, e-journal support), Research Directory (Theses/Dissertations, University publications, Working papers, and more).

Libraries, especially academic and research libraries are perceived to be knowledge repositories of scholarly content. Scholarly communication is a complex mechanism acted up on by many stakeholders. Scholarly communication refers to the formal and informal processes by which the 11 researches and scholarship of researchers, faculty and independent scholars (freelance researchers) are created, evaluated, edited, formatted, distributed, organized, made accessible, archived, used, and transformed. Publishing is the formal system whose key players include researchers, publishers (including scholarly societies), and libraries (Sosteric, et al. 2001).

### 2.2 Knowledge Repository concept and Utilization

The term "knowledge repository" appears commonly in the literature of knowledge management, especially in association with commercially available knowledge management products. It refers to a system or system architecture that houses and manages a collection of corporate intellectual assets. An idealized example of knowledge repositories is the "Dynamic Knowledge Repositories" proposed by Doug Engelbart and his group (described in Carroll, 2001).

Liebowitz and Beckman (1998) define knowledge repository as an: ...on-line computer-based storehouse of expertise, knowledge, experience, and documentation about a particular domain of expertise. In creation a knowledge repository, knowledge is collected, summarized, and integrated across sources.

A library is a collection of information resources in print or in other forms that are organized and made accessible for reading or study. The first libraries as repositories of books were Greek temples and those established in conjunction with the Greek schools of philosophy in the 4th century BC. Today's libraries contain periodicals, videos, compact discs, and other materials in addition to books. The growth of on-line communications networks has enabled library users to search electronically linked databases worldwide.

They are now established on all continents, with the largest repositories being found in Europe, North and South America, Japan, India and Australasia. Interest in establishing and promoting repositories is likely to show continued growth, particularly as academic staff increase their online presence and adapt their work patterns to the new Web 2.0 tools such as blogs, RSS, wikis, and virtual communities. As Lynch (2003, p328) noted "the intellectual life and scholarship of our universities will increasingly be represented, documented, and shared in digital form." Institutional repositories are one of the tools that make this possible.

There are many techniques and technologies currently being used to manage knowledge. Some organizations are concerned mainly with capturing explicit knowledge and others are attempting to collect tacit knowledge through the use of expert systems and artificial intelligence.

Davenport and Prusak, for example, in their 1998 book *Working Knowledge: How Organizations Manage What They Know*, list "knowledge repositories" first in their review of knowledge management projects in practice. They claim to have "come across three basic types of knowledge repositories:

1. External knowledge repositories (example: competitive intelligence)
2. Structured internal knowledge repositories (example: research reports, production Oriented marketing materials and methods)
3. Informal internal knowledge repositories (example: discussion databases full of Know-how, sometimes referred to as 'lessons learned')."

Academic administrators and librarians appear motivated to create institutional repositories for two primary reasons: improving access to and preservation of unpublished digital assets, and reforming the scholarly publishing system.

The university library's traditional focus on collecting, storing, and preserving published scholarly material is related and extended to new responsibilities for handling unpublished digital assets such as working papers, research databases, and multimedia course material. Administrative and academic computing responsibilities for data warehousing, teaching technology and course management systems also are related to the institutional repository through the Knowledge Bank project. And other Knowledge management activities such as the development of expertise directories and information policies for rights and privacy are viewed as related parts of an overall knowledge management program.

One of the most popular digital repositories is DSpace (Smith, et al., 2003). It was originally designed by developers at the MIT Libraries and HP Labs and currently is used by over 250 institutions. DSpace™ is a free, open source software platform for building repositories of digital assets, with a focus on simple access to these assets, as well as their long-term preservation (Smith, et al., 2003). It was originally designed with a particular service model in mind: that of institutional repositories of research material, and particularly research articles, which are produced by academic research institutions. A drawback of DSpace is that it uses a fixed web interface and cannot be easily integrated in other systems.

Another example is the Knowledge Pool System ARIADNE (Duval E., et al., 2001). It was a European Educational digital library project initiated in 1996 by the European Commission's telematics for education and training program. It consist on a distributed digital library of education resources delivers reusable components to teachers and learners form different cultures and with different languages. The most innovative aspect of ARIADNE was its metadata. The new aspect that this project proposed was the semi-automatically generation of this metadata. Since the typical

Many of the benefits identified, though, are at the institutional level, or even at the national level. In Japan, for example, the Ministry of Education, Culture, Sports, Science and Technology has encouraged Japanese university libraries to develop institutional repositories to promote sharing of knowledge throughout Japan and internationally (Cullen and Nagata, 2008). The development of institutional repositories in Africa is seen as a

way of making institutional research outputs available to a community with less than optimal access to resources (Musoke, 2008). In a survey of academic library directors and senior administrators carried out in 2006, Rieh et al. identified "capturing the intellectual capital of [the] institution" as the most important benefit of an institutional repository (Rieh et al., 2007). Improved long term preservation of the institution's digital assets is another benefit to be realized through centralizing content in known, standardized formats (Crow, 2002). Other proposed benefits focus on increased institutional prestige from exposing research carried out by staff and students. Crow suggests that this will be a much more effective way of highlighting an institution's total academic outputs, which are otherwise spread among many publications (Crow, 2002). He sees a further benefit in increased differentiation between institutions, because of the unique content in individual repositories, and suggests that potential students with an interest in a discipline may be attracted to an institution that makes its research in the field widely available through a repository.

### **3. A proposed of an integrated e-library database System for Jordanian Universities**

Integrated library system is not applied in too many universities and institutions, e-library is most commonly used, Reitz (2004) defines an integrated library system as "an information retrieval system that allows users to search for books, periodical articles, and electronic resources such as computer files and websites, in one operation using a single interface, instead of searching online catalogues, bibliographic databases, and web search engines separately. Seamless access is a goal that remains to be realized in most libraries.

Most Jordanian universities are shifting toward e-library particularly through the internet, for instance Jordan University as the first established university in Jordan and the largest university has an advanced e-library system that allows many users to access their e-library database system.

The 1980s are considered the beginning of the automation era as far as libraries and information centres in Jordan are concerned. As for the use of electronic alternatives and on-line searching, this venture was limited to a very few libraries. On-line searching was exclusively provided by the Royal Scientific Society (RSS) library, the University of Jordan Library (UJL), Yarmouk University Library (YUL), the Jordan University of Science and Technology Library (JUSTL) and the National Information Centre (NIC) ± YUL was unique in establishing a local information system based on CD-ROMs (Younis, 1999).

The proposed e-library database system in this paper visualizes the integration of All Jordanian e-libraries in a larger database, it is all about depositing and retrieving knowledge when needed by Students or members, Academics, communities and may be by the whole society as well. Figure (1) display the idea of integrating the Jordanian universities e-libraries through the use of information technology particularly the networking technology that include intranet, extranet and internet, to best enable the speed and seamless access to all e-library databases that represent each university.

#### *3.1 Integrated e-Library data base users and implications*

People who benefit from the library directly or indirectly, either on site or virtually. The library directly serves students, faculty, staff, alumni, consortia and community members in their efforts to expand their intellectual experience.

Knowledge is codified and stored in a repository under the assumption that it will be useful to others in the university and outside for public, this approach allows many people to upload their knowledge and allow them to search for and retrieve codified knowledge, as it is shown in figure (1).

Integrated online library systems today are considered part of the "knowledge" or "Information" software network that manages an institution internal and external database resources (Dzurinko, 1998). According to the ALA library technology report (May-June 2003) the definition of an ILS is shifting as the changing face of technology develops, It must be able to handle many formats, accommodate searching on the internet, provide a variety of functions including manipulating electronic data, working with graphics, and expediting resource sharing.

Integrated e-Library data base system does enable the creation of local content, strengthen the mechanisms and capacity of the library's information systems and services. They increase the portability, efficiency of access, flexibility, availability and preservation of content. it can help move the country towards realizing the enormously powerful vision of 'anytime, anywhere' access to the best and the latest of human thought and culture, so that no classroom, individual or a society is isolated from knowledge resources. Integrated e-Library data base system brings the library to the user, overcoming all geographical barriers.

In this paper Integrated e-library database system can be define as an information retrieval system linking all Jordanian universities (eight public and thirteen private universities) e-libraries in one database system, that

allows users (Academicians, Students, Researchers...etc) to uploads, search and downloads books, periodical articles, Researches, Projects, Documents, Archives, Dissertations, Theses, Proposals .....etc in one operation using a single interface in seamless and fast access by public where ever they be and 24 H,7D a week, in an organized manners whether it is free access or in subscription. Fig. (2) Display the proposed integrated e-library database system for Jordanian universities that may look like.

#### 4. Benefits of knowledge repository based-integrated e-library

Over the past five years, the implementation of Institutional Repository has been growing rapidly and the publications on IRs have flourished accordingly. For instance Markey, Rieh, St. Jean, Kim, and Yakel (2007) provides one of the most comprehensive overviews of current IR practices including staffing, finances, planning, system selection, policies, benefits, and beneficiaries. Among other findings, this census demonstrates that the institutional repository movement is widespread and not just confined to research libraries. We found that academic library in large and small colleges and universities, liberal arts, medical, and other technical universities can all see potential benefits.

Gibbons (2004) presented compelling reasons for why an organization would want to establish an IR including providing an infrastructure for preservation of digital content, lowering the barrier to document distribution, creating a centralized digital showcase in which research, teaching, and scholarship can be highlighted, and facilitating wider distribution. Yeates (2003) also listed the benefits of IRs, such as: extending the range of knowledge sharing, existing investment in information and content management systems can be leveraged; and more flexible ways of scholarly communication are available. Academic institutions would also reap these benefits. IR proponents argue that they form the infrastructure for a new scholarly publishing paradigm that wrests control away from publishers and puts it back in the hands of the academy, increase visibility, prestige, and public value of contributors, maximize access to the results of publicly funded research, and increase the number and diversity of scholarly materials that are collected and preserved by academic institutions (Crow 2002a, 2002b; Chan 2004). Given the number of previous studies on values and benefits of IR, it is time to learn more from IR staff about how they perceive these benefits based on their actual experiences with IR implementation and planning.

- Key services that repositories might provide range over several functional areas:
- Store, index, distribute, and preserve the research works, and other works as well of Jordanian universities.
- Scholars, researchers, lecturers, faculty staff, administrative staff, (learning support staff such as IT staff, librarians, etc), students will be able to deposit their knowledge to the Integrated e-Library data base system.
- Enable and enhances the speed of access and download the resources by all stakeholders stored in different universities e-library database (Researchers, Academics and Students).
- On line Published Materials that include Books, e-books, e-journals, Dissertations, Theses, projects and government documents.
- New modes of publication and peer review.
- Corporate information management (records management and content management systems).
- Data sharing (re-use of research data, re-use of learning objects) Preservation of digital resources.
- University gain or benefit from the knowledge Integrated e-Library data base system, through displaying their knowledge excellence and allow people to learn from their knowledge expertise.
- More organized of resources instead of dispersion, security and protection of rights and prevent of work duplicates and thefts.
- Allows knowledge sharing and collaboration in more efficiently among and between academics and students across universities.
- Lower printing and copying costs

#### 5. Conclusion

In this paper we have discussed our approach for building a knowledge repository for storing, searching, accessing and retrieving knowledge resources based on the proposed framework that suggest the integrating of Jordanian universities e-library in one database system that enable and facilitate the access of knowledge seekers and knowledge researchers to log into the database through different information technology tools anytime and

from any where 24hours 7 days a week, the access can be freely or subscription access as designated for academics , researchers and students and other users as, well.

Building a knowledge repository is heavily dependant on integrating e-libraries in one database system that can enable students, researchers, academics etc to access and upload or publish their works to preserve the knowledge repository in the long term. Therefore, the knowledge repository success will be fulfilled if Jordanian universities agree in integrating their e-libraries in one database system.

Electronic publications have some special problems of management as compared to printed document. Issues and Concerns have been discussed which need to be addressed in the proposed project that include infrastructure Technical Issues, acceptability, access restrictions, readability, standardization, authentication or security, publishing rules and rights preservation, copyright, user interface etc. But still the advantages are more and therefore the importance of e-libraries or digital libraries has been recognized by many nations of the world.

The proposed of Integrated universities e-library to come through and succeed requires from the Jordanian ministry of higher education and universities state and private as, well to begin collaborating and set down and put this national project on table and begin their consultation to reach a decision that can make this project come through.

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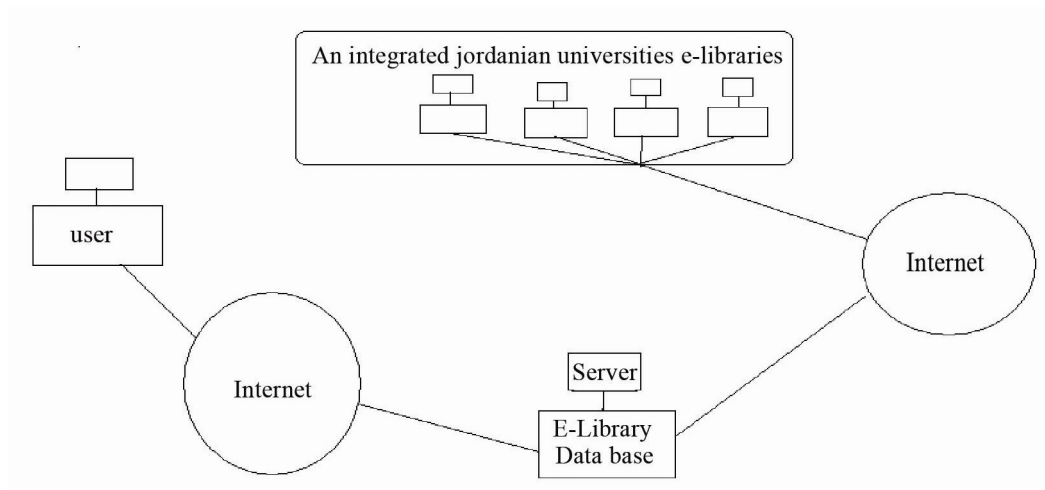


Figure 1. Integrated e-Library data base users and implications

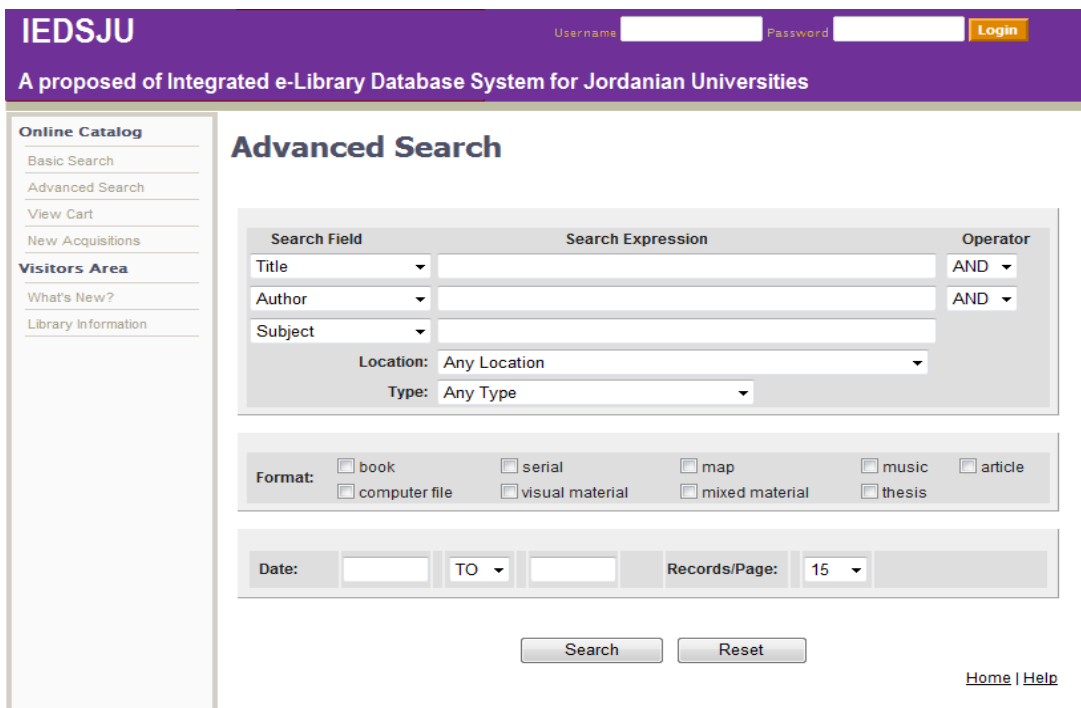


Figure 2. The Searching & Browsing Interface